

IN THE CLAIMS:

Please amend the claims as follows:

1. (Original) Method for pre-processing speech, in particular in a method for recognizing speech, comprising the steps of:
 - receiving a speech signal (S),
 - separating a spectrum (F) of said speech signal (S) into a given number (N) of predetermined frequency sub-bands (F_1, \dots, F_N),
 - analyzing said speech signal (S) within each of said frequency sub-bands (F_1, \dots, F_N),
 - thereby generating respective band-dependent acoustic feature data (O_1, \dots, O_N) for each of said respective frequency sub-bands (F_1, \dots, F_N), which band-dependent acoustic feature data (O_1, \dots, O_N) are at least in part representative for said speech signal (S) with respect to a respective frequency sub-band (F_1, \dots, F_N),
 - deriving band-dependent likelihoods (b_1, \dots, b_N) for occurrences of speech elements (P_1, \dots, P_m) or of sequences thereof within said speech signal (S) based on said band-dependent acoustic feature data (O_1, \dots, O_N) and/or a derivative thereof,
 - analyzing said speech signal (S) within said entire spectrum (F),
 - thereby generating full-band acoustic feature data (FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$), which are at least in part representative for said speech signal (S) with respect to said entire spectrum (F),
 - deriving a full-band likelihood (B_{FF} ; B_{SSUB}) for occurrences of speech elements (P_1, \dots, P_m) or of sequences thereof within said speech signal (S) based on said full-band acoustic feature data (FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) and/or a derivative thereof,

- deriving an overall likelihood (B) for occurrences of speech elements (P_1, \dots, P_m) or of sequences thereof within said speech signal (S) based on said band-dependent likelihoods (b_1, \dots, b_N) and said full-band likelihood ($B_{FF}; B_{SSUB}$).

2. (Original) The method according to claim 1,

characterized in that

when deriving said overall likelihood (B) said band-dependent likelihoods (b_1, \dots, b_N) are combined to a union model likelihood ($B_{U,MFCC}$) by determining the number of uncorrupted frequency sub-bands of said frequency sub-bands (F_1, \dots, F_N), and adding all possible combinations of products of different band-dependent likelihoods (b_1, \dots, b_N) corresponding to respective frequency sub-bands.

3. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1,

characterized in that

said band-dependent acoustic feature data (O_1, \dots, O_N) comprise respective band-dependent mel-frequency cepstral coefficient features, which are based on mel-frequency cepstral coefficients and/or a derivative thereof derived from respective frequency sub-bands (F_1, \dots, F_N).

4. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1,

characterized in that

a predetermined broadband noise robustness technique is applied prior to deriving said full-band likelihood term ($B_{FF}; B_{SSUB}$).

5. (Original) The method according to claim 4,

characterized in that

said broadband noise robustness technique is based on a frequency-filtering technique.

6. (Original) The method according to claim 4,

characterized in that

said broadband noise robustness technique is based on a method of spectral-subtraction.

7. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1,

characterized in that

said full-band acoustic feature data (FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) comprise filter bank energy features (FBE-F), which are based on filter bank energies derived from said entire spectrum (F).

8. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1,

characterized in that

said full-band acoustic feature data (FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) comprise filtered filter bank energy features (FFBE), which are based on filtered filter bank energies derived from said entire spectrum (F).

9. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1,

characterized in that

said full-band acoustic feature data (FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) comprise full-band mel-frequency cepstral coefficient features, which are based on mel-frequency cepstral coefficients and/or a derivative thereof derived from said entire spectrum (F).

10. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1,

characterized in that

said full-band acoustic feature data (FBE-F; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) and/or said band-dependent acoustic feature data (O_1, \dots, O_N) comprise PLP-linear prediction filter features, which are based on PLP-linear prediction filter coefficients.

11. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1, characterized in that

said full-band acoustic feature data (FBE; FFBE; FBE-F-SSUB; $O_{F,SSUB}$) comprise spectrally-changed full-band mel-frequency cepstral coefficient features ($O_{F,SSUB}$), which are generated by applying a method of spectral subtraction to said full-band mel-frequency cepstral coefficient features (O_F).

12. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1, characterized in that

said band-dependent likelihoods (b_1, \dots, b_N) and said likelihood term (B_{FF} ; B_{SSUB} ; $B_{U,FF}$) are determined using a probability estimator.

13. (Currently Amended) The method according to ~~any one of the preceding claims~~ claim 1, characterized in that

said filtered filter bank energies (FFBE) are derived from said filter bank energies (FBE) by subtracting ($f(i) = f(i+1) - f(i-1)$) a first filter bank energy (FBE_{i-1}) from a second filter bank energy (FBE_{i+1}), wherein said first filter bank energy (FBE_{i-1}) corresponds to a first discrete frequency and said second filter bank energy (FBE_{i+1}) corresponds to a second discrete frequency, lying two discrete frequency steps after said first filter bank energy (FBE_{i-1}).

14. (Currently Amended) Speech pre-processing system, in particular integrated into a speech processing system, which is capable of performing or realizing a method for pre-processing speech according to ~~any one of the preceding claims 1 to 13~~ claim 1 and/or the steps thereof.

15. (Currently Amended) Computer program product,

comprising computer program means adapted to perform and/or to realize the method of pre-processing speech according to ~~any one of the claims 1 to 13~~ claim 1 and/or the steps thereof, when it is executed on a computer, a digital signal processing means, and/or the like.

16. (Original) Computer readable storage medium,
comprising a computer program product according to claim 15.